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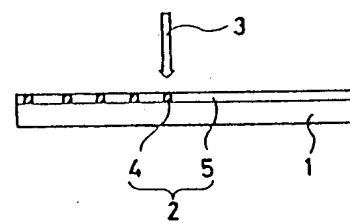
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54 Superconducting ceramics and methods for manufacturing the same.

57 A layer (2) of a material of substantially the same chemical composition as a known high T_c ceramic superconductor is formed on a substrate (1) by sputtering and is selectively irradiated with a laser beam (3) so as to define irradiated (4) and non-irradiated (5) regions. The sputtered layer (2) is disordered and has many lattice defects and imperfections and thus is basically non-superconducting, but by irradiation with a laser beam (3) the sputtered layer (2) is melted and then recrystallizes into an ordered and superconducting material. In another embodiment, the sputtered layer is already superconducting and is changed into a non-superconducting material by irradiation with a laser beam, said irradiation being carried out at a relatively low temperature in order to rapidly cool the irradiated portion and convert it into a disordered, non-superconducting state.

A preferred substrate is chosen from the group containing YSZ, yttria and zirconia, which have thermal expansion coefficients substantially matching that of superconducting oxide materials.

FIG.1(C)





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	EP-A-0 202 895 (K.K. TOSHIBA et al.) * Page 3, lines 20-27; page 26, line 19 - page 28, line 31; figure 12 *	1,3,4	H 01 L 39/24 H 01 L 39/12// H 01 F 5/08
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A	J. APPL. PHYS., vol. 52, no. 8, August 1981, pages 5107-5111, American Institute of Physics; Y. MATSUI et al.: "Laser annealing to produce ferroelectric-phase PbTiO ₃ thin films" * Pages 5107-5108, paragraph II *	1-3, 13	
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P,X	JAPANESE JOURNAL OF APPLIED PHYSICS, vol. 27, no. 2, February 1988, pages L231-L233, Part 2, New York, US; N. AIZAKI et al.: "YBa ₂ Cu ₃ O _y super-conducting thin film obtained by laser annealing" * The whole document *	1-3, 13,14	TECHNICAL FIELDS SEARCHED (Int. Cl. 4) H 01 L
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E	EP-A-0 286 106 (HITACHI LTD.) * Page 10, lines 34-55; page 11, lines 32-44; page 12, lines 23-44; figures 20,23,28 *	1-3, 6,7, 10,13, 14	
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THE HAGUE			
Place of search		Date of completion of the search	Examiner
THE HAGUE		10-11-1989	MORVAN
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European Patent
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid.
- namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

X LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions.

namely:

See sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid.
- namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.
- namely claims: 1-11, 13-16



Application number

EP 88 30 2227

- 2 -

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.)
E	EP-A-0 285 106 (SUMITOMO ELECTRIC IND. LTD.) * Column 3, line 29 - column 4, line 9; column 9, line 48 - column 10, line 43; figures 6, 7 *	1-5, 13	
E	WO-A-88 10 011 (SIEMENS A.G.) * Page 6, line 1 - page 8, line 3 *	1, 3, 4, 5, 13, 14	
E	DE-A-3 815 185 (SIEMENS A.G.) * Column 4, line 57 - column 5, line 65; figure *	12, 13	
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
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Place of search		Date of completion of the search	Examiner
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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A :	technological background		
O :	non-written disclosure		
P :	intermediate document		



LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-11,13-16: Method of forming a ceramic superconducting layer by irradiating with light, and thereby melting, at least one portion of a non-superconducting layer formed on a surface and permitting the irradiated portion to resolidify in a superconducting configuration, the non-superconducting layer having a chemical composition being substantially consistent with that of a superconducting ceramic.
2. Claims 12,17: Method of forming a ceramic superconducting layer by irradiating with light, and thereby melting, at least one portion of a non-superconducting layer formed on a surface and permitting the irradiated portion to recrystallise whereby it is converted into a superconducting ceramic material, the non-superconducting layer having a composition enabling said conversion.
3. Claims 18,19: Ceramic layer comprising two different regions, said regions being either superconductive or not, depending on their degree of crystallinity, the superconducting region having a higher degree of crystallinity than that of the non-superconducting region.
4. Claim 20: Superconducting ceramic in general, formed by recrystallising a non superconducting ceramic, involving an irradiation step.
5. Claims 21-24: Method of forming a non-superconducting region by irradiating with light and thereby melting a portion of a superconducting ceramic layer formed on a surface and cooling it in order to convert the irradiated portion into a non-superconducting material
6. Claims 25-29: Superconducting device comprising a superconducting oxide ceramic element on a substrate, the surface of said substrate, which is in contact with said element, being made from at least one of YSZ, yttria and zirconia. Method of making the same.